

basal patch; a heavily dented and strongly curved postmedian line; a subapical triangular brown patch, succeeded by an intraneural series of large brown subterminal patches; cilia conspicuously chequered with white and brown. Hind wing dull brown, paler than fore wing, with three darker indications of transverse bands near base; basal area pale brownish grey. Abdomen with a broad greyish-black dorsal stripe and subdorsal black and white patches; at base of first segment subdorsal tufts of orange. Thorax blackish brown. Abdomen below pale, whitish.

Expanse 100–110 mm.

Hab. Tenimber Island (*W. J. Frost*), 1918; 2 ♀ ♀.

Type in Coll. Joicey.

XIII.—*A new Species of the Nematode Genus Crossocephalus from the Rhinoceros.* By H. A. BAYLIS, M.A.

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THE genus *Crossocephalus* has hitherto been known only from its type-species, *C. viviparus* (v. Linstow)*, which occurs in the zebra. I have now to place on record a second form, parasitic in a rhinoceros (*R. sumatrensis*) from the Malay Peninsula. The material at my disposal is unfortunately not in the most perfect state of preservation, but it serves for the purpose of a brief description, and is sufficient, in my opinion, to warrant the erection of a new species. Incidentally it also throws some light on a matter which has been a source of confusion in the descriptions of *C. viviparus*, viz., the structure of the very complicated and peculiar mouth-apparatus.

Crossocephalus longicaudatus, sp. n.

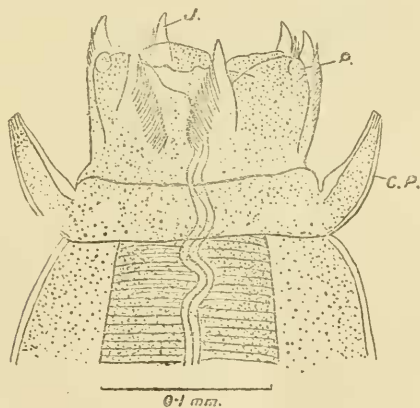
Host: *Rhinoceros sumatrensis*.

This is a short, stout little worm, tapering rather suddenly at the anterior end, in the region of the œsophagus. The male measures about 7 mm. in length and 0.5 mm. in maximum thickness, the female 9 to 10 mm. in length and about 0.63 mm. in thickness. The cuticle has very fine transverse striations. There are no lateral alæ. The mouth is provided with six chitinous jaws (fig. 1, *J.*), each of which bears a row of bristles externally, and a sharp, slightly curved

* *Pterocephalus viviparus*, v. Linst., 1899; *Crossocephalus viviparus*, Railliet, 1909.

tooth at its free end. The jaws are arranged in three pairs, with the bristles of each pair turned towards each other. Between the pairs of jaws there are very slightly raised papillæ (fig. 1, *P.*). The jaws may either be everted and project forward, as in the figure, or they may be completely inverted into the buccal end of the œsophagus, in which case the teeth point backwards, and the rows of bristles meet in the middle of the lumen. Behind the head there is a cuticular collar, bearing on each side a very large forwardly curved papilla (fig. 1, *C.P.*). When the jaws are inverted these papillæ project in front of the head like a pair of horns or ears. No second pair of "neck-papillæ" corresponding to those of *C. viviparus* has been detected.

Fig. 1.



Crossocephalus longicaudatus. The head, showing the jaws in the everted position; dorsal view, highly magnified.

C.P., ear-like papilla on the cuticular collar; *J.*, jaw; *P.*, oral papilla.

The œsophagus is about 1 mm. long, and expands into a bulb before opening into the intestine.

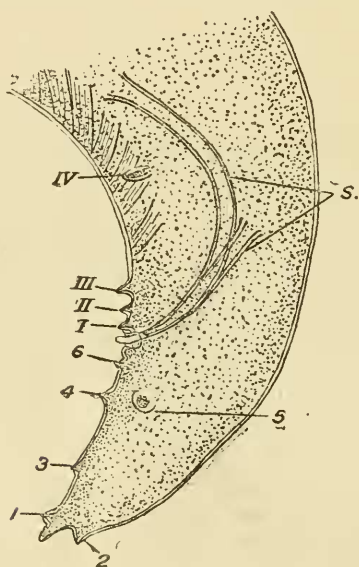
The excretory pore is situated at about 2 mm. (slightly less in the male) from the anterior end. It is in the form of a long transverse slit on the ventral surface, having its lips enclosed within an oval border of radiating cuticular ridges, as has been described and figured by Gedoelst (1916) in the case of the type-species.

In the male the tail (fig. 2) is 0.25–0.3 mm. long, and has a fairly well-marked ventral flexure. There are no alæ. The spicules (fig. 2, *S.*) are unequal in length, measuring

respectively (in a straight line from base to tip) about 0.44 mm. and 0.24 mm. The caudal papillæ are rather large and conical. There are ten pairs, four preanal (fig. 2, I-IV) and six postanal (fig. 2, 1-6). The fourth preanal pair (IV) and the fifth postanal (5), counting from the tail-tip, are laterally placed. The second postanal pair (2) are actually dorsal in position.

The body of the female narrows suddenly at the base of the tail. The anus opens in a transverse fold of the cuticle, which is followed by several wrinkles. The tail tapers to a

Fig. 2.



Crossocephalus longicaudatus. Lateral view of the tail of the male, highly magnified.

S., spicules; 1-6, postanal papillæ; I-IV, preanal papillæ.

fine point, and is 1.7 mm. to 1.9 mm. long. The position of the vulva has not been made out with certainty, but it is probably very close to the anus. The uterus contains embryos in various stages of development, not always enclosed in an egg-membrane, and often of very large size, so that the species is evidently viviparous, like the type-species.

The chief points in which this species differs from *C. vivi-*

parus, according to the descriptions of v. Linstow (1899) and of Gedoelst (1916), are:—

- (1) The much greater length of the tail in the female.
- (2) The absence of a second, flattened pair of neck-papillæ behind the cuticular collar bearing the long ear-like papillæ.
- (3) The absence of the six curved anterior spines ("crochets" of Gedoelst; "Haken" of v. Linstow) on the lips when the jaws are in the inverted position.
- (4) The larger number of caudal papillæ in the male.

The following comparative table of measurements in the two species may serve to complete the foregoing account. It will be observed that the correspondence between them is remarkably close, the most striking exception being the length of the tail in the female. All the measurements are in millimetres. The figures in square brackets have been calculated from v. Linstow's fractional measurements:—

	<i>C. viviparus</i> (v. Linstow).		<i>C. viviparus</i> (Gedoelst).		<i>C. longicaudatus</i> .	
	♂.	♀.	♂.	♀.	♂.	♀.
Length	6.32	6.76	..	5.5-9.5	7.0	9-10
Thickness	0.43	0.55	..	0.28-0.512	0.5	0.63
Length of œsophagus	[1.02]	[0.9]	..	1.0-1.15	1.0	1.0
Length of tail ..	[0.26]	[0.55]	..	0.575	0.25-0.3	1.7-1.9.
Length of spicules	0.35, 0.26	..	..	..	0.44, 0.24	..
Vulva from anus.	..	[2.34]	..	0.192-0.208	..	(probably close to anus).
Excretory pore from ant. end.	(close behind œsophagus).		..	1.9-2.2	(less than 2). 2.0	
Excr. pore, outside measurements of striated border ..	..	..	..	0.4 × 0.055	0.31 × 0.07	
Do., thickness of border .....	..	..	..	0.014	0.025	

As regards the structure of the mouth-parts, it has already been stated that some confusion exists in the descriptions of *C. viviparus*. This appears to have been due to the fact that v. Linstow (1899) saw examples with the jaws in both positions—everted and inverted,—whereas Gedoelst (1916) was dealing only with specimens having the jaws inverted

within the œsophagus. It must be admitted, however, that the figures accompanying v. Linstow's account are decidedly confusing, and it is not improbable that a failure to recognize the manner in which the entire jaws fold down, like the blades of a penknife, into the œsophagus, has been at the root of the matter. The condition in the present species makes it almost certain that the action of the jaws will be found to be the same in *C. viviparus*.

One other point remains to be noticed. It does not seem at all clear that the "kegelförmige Spitzen" of v. Linstow are the same as the "papilles céphaliques" of Gedoelst, as the latter supposes, since the former not only figures them as being *within* the six "Haken," but expressly states that this is the case. The fact that both authors describe and figure six outwardly directed hooks on the lips in addition to what I have termed the jaws ("Flügel" of v. Linstow, "lames pectinées" of Gedoelst) seems to indicate that they are both referring to the same structure. The presence of the "Spitzen," however, seems doubtful, and one is rather led to believe that v. Linstow's account, in this particular, may be erroneous, possibly as the result of a misinterpretation of the structure of the jaws. The present species apparently possesses neither the "Spitzen" nor the "Haken," but it occurs to me as not impossible that the incurved terminal teeth of the jaws, when partly, but not wholly, everted, might, by crossing each other, give rise to the appearance of six forwardly-directed points occupying the centre of the oral aperture.

The writer's thanks are again due to Dr. G. A. K. Marshall, of the Imperial Bureau of Entomology, for the opportunity of examining this material, which was collected by Mr. T. R. Hubback.

REFERENCES.

- GEDOELST, L. 1916. "Notes sur la Faune Parasitaire du Congo belge," *Revue Zool. Afric.* v. fasc. 1, p. 1.
 LINSTOW, O. VON. 1899. "Nematoden aus der Berliner Zoologischen Sammlung," *Mitt. Mus. Nat. Berlin*, i. 2.

XIV.—*Descriptions and Records of Bees.*—LXXXVI.

By T. D. A. COCKERELL, University of Colorado.

THE Indian bees recorded below were all received from Mr. T. V. Ramakrishna Ayyar.

Crocisa ramakrishnæ, Cockerell.

Bangalore, at flowers of *Cosmos*, Aug. 25 (T. B. F.);